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ABSTRACT

In a study to determine the effects of writing on the computer versus traditional writing by hand, 22 fourth grade students were randomly assigned to samples using either a computer or paper and pencil. The study hypothesized that (1) children are not more willing to revise and improve their writing using a word processor when compared to the pencil and paper approach, (2) students will not want to write more often or produce longer compositions, (3) typing ability does not present special problems to students alienated from writing, (4) students will not transfer learning from word processing writing to manual writing, and (5) writing with a word processor does not change writers' behavior. Three creative writing topics were assigned during consecutive weeks. The control group was instructed to complete all writing manually, while the experimental group completed all writing from beginning stages to the final draft on the computer. The stories were analyzed according to the amount and type of editing and revision attempted. Results showed no significant differences in the editing or revising of the two groups. A literature review on microcomputer usage and writing achievement is included. (Tables of data are appended.) (HOD)

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WORD PROCESSOR VERSUS "THE PENCIL" EFFECTS ON WRITING

BY

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Submitted in Partial Fulfillment of the Requirements
of the Master of Arts Degree in Reading Specialization
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ABSTRACT

This study was proposed to determine the effects of writing on the computer versus traditional writing by hand. Twenty-two fourth grade students were randomly assigned to the computer and the pencil sample. Each student wrote three stories. These stories were analyzed according to the amount and type of editing and revision attempted. Results indicated there was no significant difference between the two samples.

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In this age of technology, it has become necessary for the school to prepare students to work on computers. Professional authors, educators, and others are beginning to understand that the computer can be a useful tool to aid in the process of writing.

A number of educators have had success with a word processor approach to writing on the computer. According to Gail G. Womble (1984) high school students in her classes have added, deleted, and moved text more than they do with the pencil.

Mimi Schwartz (1982), a Professor of Writing at Stockton State College, claims that the major contribution the computer has made to writing is that it allows for easy revision.

Because the physical act of writing is laborious for young children, Seymour Papert in Mindstorms states that the first draft is often the final draft. Studies have been made to determine the effect of word processing on writing using college and high school students as subjects.

This study was established to add to the body of information available on the values of the computer by attempting to determine the effects of a word processor on the writing of fourth grade students.

Several questions are in need of investigation: Do children seem more willing to revise and improve their writing using a word processor? Do students want to write more often and produce longer compositions? Will typing ability present special problems to students already alienated from writing? What learning will students transfer from word processing writing to "the pencil" method? Does writing with a word processor change writers' behavior?

Many researchers have studied high school and college students in an attempt to find the answers to these questions. Very little research, however, has been conducted on an elementary fourth grade level. Because many elementary schools have computers, research is necessary to determine the effects of word processing at this level.

HYPOTHESIS

Children are not more willing to revise and improve their writing using a word processor when compared to the manual or pencil approach; students will not want to write more often or produce longer compositions; typing ability does not present special problems to students already alienated from writing; students will not transfer learning from word processing writing to manual writing; writing with a word processor does not change writers' behavior.

DEFINITIONS

Some basic definitions and concepts need to be clarified for the purposes of this study. Following is a list of words and their definitions as used in this research:

word processor - the BANK STREET WRITER

revisions - changes made such as adding, deleting, moving text, etc. from one draft to another

editing - proofreading corrections such as capitals, punctuation, and spelling

PROCEDURES

Twenty-two students from one fourth grade classroom were randomly assigned using a table of random numbers to either the experimental or control samples to comprise two samples of eleven each. The students in the experimental group were required to complete all creative writing assignments using the BANK STREET WRITER; the control group utilized the pencil.

Before beginning the study the experimental students were instructed as a group in the following areas:

Entering Text

Cursor Movement and Correction

Erase and Unerase

Move and Moveback

Find and Replace

The method of instruction was the BANK STREET WRITER TUTORIAL program. On each of five consecutive days one lesson was reviewed by the group. The remainder of the school day was designated for individual practice on the particular lesson.

During consecutive weeks three creative writing topics were assigned. The control group was instructed to complete all writing assignments manually. The experimental group was instructed to complete all writing from beginning stages to the final draft on the computer.

The procedure for completing a story was first to generate a story on a given topic. Student and teacher would then discuss possible changes and revisions. After the student-teacher conference the student was asked to rewrite and edit. The number of revised copies was determined by the judgement of the student.

The drafts from each group were counted and analyzed according to the types of corrections or revisions which were made by the students. This data was then interpreted and examined for statistical significance using t tests.

ANALYSIS OF DATA

Raw scores were determined for each sample by adding the number of revisions and editing completed by each student. The total raw score of 747 revisions-editings for the computer group was only sixteen more than the 731 achieved by the control group.

In Table I the Mean, Standard Deviation, and t of the

TABLE I

TOTAL SCORES ACHIEVABLE IN RELATION TO COMPUTER AND PENCIL SAMPLES

Sample	M	SD	t
Computer	67.91	35.63	.11
Pencil	66.45	27.65	

NS

computer and pencil groups are compared. The means of the computer and pencil groups are 67.91 and 66.45 respectively. The difference between the two samples is 1.46 which produced a critical value (t test) of .11. This indicates that mean differences were too small to show significance.

In Table II the Mean, Standard Deviation, and t illustrates that the pencil group edited more while the computer group revised more often.

TABLE II

COMPARISON OF EDITING AND REVISING CHARACTERISTICS OF COMPUTER AND PENCIL GROUPS

	N	SD	t	
Editing				
Computer	28.55	18.90	.55	NS
Pencil	33.00	19.34		
Revision				
Computer	40.27	19.84	.89	NS
Pencil	33.86	16.25		

As far as editing functions are concerned, the computer group had a mean of 28.55, while the pencil group had a mean of 33.00. The difference between the means of 4.45 produced a t of .55 which was not significant. Although the computer group actually corrected more punctuation, the pencil group corrected spelling and capitals more often.

In analyzing revisions the computer group revised more times and made more additions while the pencil group actually deleted more material. A mean of 40.27 for the computer sample and 33.86 for the pencil sample denotes a difference of 6.41 and a t of .89 which was determined to be statistically nonsignificant.

CONCLUSIONS

The results of this research, and within the limits of it, indicate that there is basically no significant difference in the editing or revising practices of fourth grade students in one classroom differentially instructed. Data suggest that it apparently does not matter whether students write with the traditional pencil method or the newest technology.

RECOMMENDATIONS

In future studies this researcher recommends that students be given additional practice time for learning to type and for familiarizing themselves with the computer keyboard.

Teacher-made practice lessons in entering text, cursor movement and correction, erase and unerase, move and moveback, and find and replace would have been helpful to these young computer writers.

More than one computer in the classroom would also be advantageous so that students would have daily access to a computer.

Lastly, a full year of observation and study by a researcher could be of benefit in such research. As time passed and the computer students became more familiar with

the various techniques needed, they began to utilize the components of the BANK STREET WRITER to its fullest. It might, therefore, be possible to learn more about computer versus pencil composing/writing differences when familiarity is well-developed.

MICROCOMPUTER USAGE AND WRITING ACHIEVEMENT: RELATED LITERATURE

The computer revolution is here to stay! At present there are approximately 700,000 computers in classrooms opposed to 30,000 only five years ago (BETTER HOMES AND GARDENS, November 1985). As the price goes down (and the power of the systems goes up), all classrooms will probably be equipped with microcomputers. The total amount spent by schools on computers and related software and hardware in 1983 may have been as much as one-third the amount they spent on books for instruction in all subjects and all grade levels combined (Becker, 1984). As educators we must prepare students for the time when all students will have access to the computer. More and more educators--especially the recently graduated computer-savvy generation--are using computers and word processors for composition instruction and in the teaching of writing revision (Cronnell, 1981).

Writing instruction is enhanced by using a word processor for many reasons. After typing the text (or while typing it) one can do a variety of things. The writer can delete, insert, rearrange, change, and print out the final text. Cronnell (1981) claims that in "pencil" writing students don't revise very much. But with the word processor, the work of revision is much easier. Some students even consider revision fun!

Becker (1984) cites that writing through the use of a computer enables students to be more productive. Any method that gets students to make repeated attempts to improve the clarity of their expressed thoughts definitely assists their productivity. At some point students must be taught to use or to develop the mechanical skills necessary to operate the equipment. Few students using word processors are proficient typists. There is a disagreement among educators about whether touch-typing skills are a necessary prerequisite for using a word processor. Unfortunately, students who have not been motivated to improve their text tend not to do so without instructional practices requiring students to do so.

Feldman (1984) found that students in her business writing course at the University of South Carolina improved their creative writing capabilities by using a word processor. She believes that word processing should be an integral part of any college writing course. Attitudes of her students changed dramatically. Writing became fun and was no longer a burden. Students began to feel comfortable with words because correctness or precision in writing was initially of little concern. There was no negative reminder of what did not work out. Students tended to be more creative because the mental processes involved in writing were freed from the drudgery. Finally, when students were asked to make revisions, they saw the request not as a negative statement but as a chance to make their writing better.

In a paper presented to the Computer Educators League (1984) Sommers and Collins described their findings. Students often develop into more fluid writers. Revision is more intensive, varied, and sustained over a longer period of time. Illegible handwriting is no longer an obstacle. Since they no longer have to recopy, students are more willing to revise. Writers develop a deeper understanding of their writing processes. Microcomputers are most helpful in classrooms when they are used integratively with sound teaching methods.

Fisher (1983) notes that word processors have been used in business for many years. Teachers who use word processors in their writing instruction say students enjoy writing more and are encouraged to become better writers. Teachers report that students write longer papers and edit and revise their papers more often and more carefully. Fisher describes three problems involving students writing with computers. There are never enough computers to go around because much time is required to compose, edit and revise. Poor typing skills could discourage a student. Lastly, faculty resistance may be a problem.

Richards (1985) explains that teachers may wonder if teaching children the fundamentals of word processing and typing are worth the time and effort it takes. However, as teachers become familiar with the software, the motivational benefits of word processing equal or exceed the technical

advantages. Students like to write with computers!

The National Council of Teachers of English have published a guide edited by Wresch (1984). In that text Wresch summarizes:

> ...the advantages generally listed for computers are individualized instruction, timely assistance and feedback, effective use of student time, a sense of the fluidity of ideas, and a freedom to produce text. Other observers may produce a list of disadvantages just as long, but for a teaching method still in its infancy and subject to rapid change, at least it is clear that computer-assisted composition has potential and warrants the interest it is currently attracting.

Daiute in her Computers and Writing Project conducted at Harvard University studied whether computer analysis and prompting programs could stimulate children to reflect on their own writing and improve it. She discovered that young writers say writing is easier on a computer because you don't have to recopy. There are limitations, however. Writers must know how to type. Cumbersome commands may be a burden on a student. Some students do benefit from prompting programs while others do not. Some students become dependent on such programs while others do not.

At the Midwest Writing Center Conference (1983) Moore presented his research about what computers should do in the writing center. He stated that word processing is a most promising computer application. However, learning to type may present special problems to students already alienated from writing. He feels that the computer may not be the great panacea for the problems students bring to the writing center. Teachers should take a critical attitude toward educational computing.

Cross and Curey (1984) have determined that "the overall effect of word processing on writing varies with the writer and with general factors related to the teacher and the class. Although the data do not support any general statements about the effect of word processing on writing, word processing use will be continued because it fits well with the current emphasis on process in writing, students like it, no major failures occurred, and positive changes in writing behavior were observed."

Several researchers have proclaimed that a change in student behavior is evident when he/she uses a word processor for writing. Meeker (1984) describes the word processor with relieving writing anxiety. Nothing is permanent. Once a student's ideas have been typed in, the editing and revising capabilities of the word processor save time and effort. Whatever changes have been made, a student is still able to work with freshly typed script. Since revision is so easy,

writers write more and revise more. Writers feel good about their writing. There is room for prewriting, for playing with ideas, and for invention. The writer continues to revise and rethink up to the last keystroke because of released anxieties about revisions and editing.

Hunter (1984) also realized that the use of word processors had changed the behavior of her students. Using student evaluation questionnaires she determined that attitudes had changed from being angry about placement in her computer writing class to being glad about the placement. She also observed that students seemed to revise a similar amount of times (computer versus pencil), but the difference was with the type of revisions. "Students who did not use text editing revised primarily on the word and sentence level; students who used text editing made more complex sentence revision. About one-third of those not using text editing also reported that the thought of recopying sometimes prevented them from making extensive revisions."

Interestingly, Lansing (1984) did some case studies on students and word processors. She discovered that although a student may like working on a computer, he/she may not have changed a negative attitude about writing. Seeing text on a screen does not necessarily mean a student will know what to change or correct.

Rodrigues (1984) presented a paper at the Annual Meeting of the Conference on College Composition and

Communication. She feels that educators should question whether learning word processing and writing during the same semester is too demanding for students. This in addition to mastering the keyboard may be more than some students can tolerate. In spite of these possible problems Rodrigues noted positive changes in student behavior toward writing near the end of the term. Some students stayed after class to continue working with a word processor. Attention spans increased and students seemed to become more independent writers by the end of the semester. They were not afraid to express themselves because they knew that anything could immediately be deleted. These college students learned to sequence their revisions beginning with content and structure, then to style and mechanical errors.

Phenix and Hannan (1984) studied word processing in the grade one classroom. The typical language experience approach was altered to include the teacher typing students' suggestions and sentences using a word processor instead of writing sentences on a large chart. Previously, what the teacher wrote on the chart might as well have been engraved in stone! But when the word processor was used, students suggested revisions which were easily made by the teacher. An experience chart of one day was rarely read another day. In this study students chose to continue writing or revising a previous day's story. Additionally, each student would receive a personal copy of the class' efforts.

Arms (1984) has noted that dyslexics can benefit from using word processors. Although they may not fare as well as a "normal" student, these and other disabled and handicapped students benefit from computers that help them function more independently in traditional classrooms.

Marcus and Blau (1983) insist that their invisible writing procedure forces participants to give more concentrated and sustained attention to their emerging thoughts than they originally gave when composing with a pen or pencil. This method discourages local editing and encourages attentiveness to the task at hand.

As word processors are continually developed for children, they will incorporate a variety of aids and coaches to assist with the problems both children and adults have in writing. We are beginning to see the development of programs that allow students to explore the ways that sentence syntax can be manipulated (Collins, National Institute of Education's Reading Synthesis Project). Whether these actually improve writing behaviors still remains to be seen. Little evidence exists to demonstrate that such is the case thus far. Affective dimensions, i.e. "like to write with computer," need to be rigorously investigated since most such findings are anecdotal or observational and are open to bias. Assertions are not evidence.

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APPENDIX

Name John C. Group Pencil

	Story 1	Story 2	Story 3	
Revisions 24				
No. of revisions	/	/	/	3
Same story throughout	yes	yes	yes	
Additions	///	///	////	10
Deletions	///	//	~~////~~ /	11
Moving text				
Editing 57				
Capitals	~~////~~ ///	/	~~////~~ /	15
Punctuation	~~////~~ /	///	~~////~~	14
Spelling	~~////~~ / ~~////~~ ~~////~~	//	~~////~~	30
				83

Name Adam D. Group Pencil

	Story 1	Story 2	Story 3	
Revisions 44				
No. of revisions	3	2	1	6
Same story throughout	yes	yes	yes	
Additions	////	~~////~~ ////	~~////~~	18
Deletions		~~////~~ ////	~~////~~	19
Moving text	/			1
Editing 26				
Capitals		///	//	7
Punctuation	//	~~////~~ ~~////~~	///	16
Spelling	//	/		3
				70

Name Lee K. Group Pencil

	Story 1	Story 2	Story 3	
Revisions 26				
No. of revisions	2	2	2	6
Same story throughout	yes	yes	yes	
Additions	II	III	IIII	9
Deletions	III	IIII	III	10
Moving text	I			1
Editing 24				
Capitals	~~IIII~~		I	6
Punctuation	~~IIII~~ I		II	8
Spelling	~~IIII~~	I	IIII	10
				50

Name Todd O. Group Pencil

	Story 1	Story 2	Story 3	
Revisions 14				
No. of revisions	/	/	/	3
Same story throughout	yes	yes	yes	
Additions	/	///	////	8
Deletions		/	//	3
Moving text				
Editing 27				
Capitals	//	/	///	6
Punctuation	///	//	///	8
Spelling	~~////~~	///	~~////~~	13

41

Name Robbie S. Group Pencil

	Story 1	Story 2	Story 3	
Revisions 33				
No. of revisions	2	2	2	6
Same story throughout	yes	yes	yes	
Additions	~~++++~~	~~++++~~ //	~~++++~~	17
Deletions	~~++++~~	//	///	10
Moving text				
Editing 50				
Capitals	~~++++~~	/	///	9
Punctuation	~~++++ ++++~~ //	~~++++~~ ///	~~++++~~ /	26
Spelling	~~++++~~ ////	///	///	15
				83

Name Margaret C. Group Pencil

	Story 1	Story 2	Story 3	
Revisions 43				
No. of revisions	2	2	2	6
Same story throughout	yes	yes	yes	
Additions	III	III	~~IIII~~ ~~III~~ III	19
Deletions	III	III	~~III~~ ~~III~~ II	18
Moving text				
Editing 72				
Capitals	~~III~~ III	~~III~~ III	~~III~~ ~~III~~ III	30
Punctuation	~~III~~	III	~~III~~ ~~III~~ ~~III~~	23
Spelling	II	~~III~~ ~~III~~ II	~~III~~	19
				115

Name Sasha K. Group Pencil

	Story 1	Story 2	Story 3	
Revisions 40				
No. of revisions	5	3	3	11
Same story throughout	yes	no	yes	
Additions	~~HH~~ //	~~HH~~	////	17
Deletions	//	///	~~HH~~ /	11
Moving text	/			1
Editing 10				
Capitals				
Punctuation	///	////		7
Spelling	/	/	/	3
				50

Name Courtney M. Group Pencil

	Story 1	Story 2	Story 3	
Revisions 17				
No. of revisions	2	2	2	6
Same story throughout	yes	yes	yes	
Additions	III		III	6
Deletions		I	IIII	5
Moving text				
Editing 18				
Capitals			I	1
Punctuation	III	IIII	II	9
Spelling		II	~~IIII~~ I	8
				35

Name Tara St. Group Pencil

	Story 1	Story 2	Story 3	
Revisions 72				
No. of revisions	5	2	8	15
Same story throughout	no	yes	yes	
Additions	~~HH~~ III	~~HH~~ III	~~HH~~ ~~HH~~ ~~HH~~	3
Deletions	~~HH~~	~~HH~~ II	~~HH~~ ~~HH~~ II	2
Moving text			I	1
Editing 36				
Capitals	~~HH~~ II	~~HH~~ I		13
Punctuation	IIII	~~HH~~	~~HH~~ III	17
Spelling	II		IIII	6
				108

Name Stephanie T. Group Pencil

	Story 1	Story 2	Story 3	
Revisions 23				
No. of revisions	3	2	2	7
Same story throughout	yes	yes	yes	
Additions	~~////~~ //		//	9
Deletions	////		///	7
Moving text				
Editing 23				
Capitals	///	/		4
Punctuation	///		/	4
Spelling	~~////~~ ////	//	////	15
				46

Name Rory M. Group Pencil

	Story 1	Story 2	Story 3	
Revisions 31				
No. of revisions	2	1	4	7
Same story throughout	yes	yes	no	
Additions	++++ /	/	/////	12
Deletions	////	//	~~++++~~	11
Moving text			/	1
Editing 18				
Capitals	/	/	//	4
Punctuation	////		~~++++~~ /	10
Spelling	/	///		4

49

Name Yi-Bin C. Group Computer

	Story 1	Story 2	Story 3	
Revisions				
No. of revisions	3	3	4	10
Same story throughout	yes	yes	yes	
Additions	~~++++~~ //	//	~~++++~~ /	1
Deletions	~~++++~~	/	///	9
Moving text				0
Editing				
Capitals	//	/	////	7
Punctuation		//	~~+++~~ ~~+~~ /	1
Spelling	//	///		5

Total Sc 59

Name Tim C. Group Computer

	Story 1	Story 2	Story 3	
Revisions				
No. of revisions	8	3	5	16
Same story throughout	no	yes	yes	
Additions	~~++++~~ ~~++++~~ ~~++++~~	~~++++~~ ~~++++~~ /	~~++++~~ ~~++++~~ ~~++++~~	41
Deletions	~~++++~~ ~~++++~~ ///	~~++++~~ ////	~~++++~~ ~~++++~~ /	33
Moving text	//	~~++++~~ /	////	12
Editing				
Capitals	////	~~+++~~ ////	////	17
Punctuation	~~++++~~ ///	///	~~++++~~ /	17
Spelling	~~++++~~ //	////	//	13

137

Name Chris E. Group Computer

	Story 1	Story 2	Story 3	
Revisions				
No. of revisions	4	3	5	12
Same story throughout	yes	yes	yes	
Additions	////	//	~~////~~ ~~////~~ /	17
Deletions	///	//	~~////~~ /	11
Moving text	//	/	~~////~~	8
Editing				
Capitals	///	/// //	/////	11
Punctuation	//	///	////	9
Spelling	/	/	/	3

71

Name Steve M. Group Computer

	Story 1	Story 2	Story 3	
Revisions				
No. of revisions	3	4	3	10
Same story throughout	yes	yes	yes	
Additions	//	///	//	7
Deletions		///	/	4
Moving text		///	///	6
Editing				
Capitals	////		///	7
Punctuation	~~////~~ /	///	////	13
Spelling	//		////	6

53

Name Bob R. Group Computer

	Story 1	Story 2	Story 3	
Revisions				
No. of revisions	5	3	9	17
Same story throughout	yes	yes	yes	
Additions	~~////~~ /	/	~~////~~ ~~////~~ //	19
Deletions	~~////~~	/	~~////~~ ~~////~~ ///	19
Moving text	/			1
Editing				
Capitals	////	/	~~////~~ ////	14
Punctuation	~~////~~ ~~////~~ /	~~////~~ ~~////~~	~~////~~ ~~////~~ ~~////~~ ~~////~~ //	53
Spelling	///		~~////~~ //	16

133

Name Jon Y. Group Computer

	Story 1	Story 2	Story 3	
Revisions				
No. of revisions	2	2	3	7
Same story throughout	yes	yes	yes	
Additions	//	/	~~HH~~ ////	12
Deletions	/	/	~~HH~~ ///	10
Moving text				0
Editing				
Capitals	//	/	~~HH~~ ///	11
Punctuation	/	////	~~HH~~ ~~HH~~	15
Spelling	////	/	~~HH~~	10

65
57

Name Caitlin A. Group Computer

	Story 1	Story 2	Story 3	
Revisions				
No. of revisions	2	2	5	9
Same story throughout	yes	yes	yes	
Additions	~~++++~~ //	///	~~++++~~ /	16
Deletions	///	/	~~++++~~	9
Moving text	/			1
Editing				
Capitals	///	/	/	5
Punctuation	////	//	~~+++~~ ~~+++~~ ///	19
Spelling	/	/	//	4

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Name Whitney D. Group Computer

	Story 1	Story 2	Story 3	
Revisions				
No. of revisions	2	1	1	4
Same story throughout	yes	yes	yes	
Additions	///	//	//	7
Deletions	/	/	/	3
Moving text				
Editing				
Capitals		/	/	2
Punctuation			//	2
Spelling	///		///	6

24

Name Rebecca L. Group Computer

	Story 1	Story 2	Story 3	
Revisions				
No. of revisions	2	4	2	8
Same story throughout	yes	yes	yes	
Additions	~~IIII~~	~~IIII~~	IIII	10
Deletions	~~IIII~~ III	II	IIII	11
Moving text				0
Editing				
Capitals				0
Punctuation	/	/	~~IIII~~	7
Spelling	/		III	4

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Name Debbie M. Group Computers

	Story 1	Story 2	Story 3	
Revisions				
No. of revisions	2	3	4	7
Same story throughout	yes	yes	yes	
Additions	///	~~////~~	//	10
Deletions	/		/	2
Moving text		//		2
Editing				
Capitals			///	3
Punctuation		/		1
Spelling	//	//	~~////~~ ///	12

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Name Alicia P. Group Computers

	Story 1	Story 2	Story 3	
Revisions				
No. of revisions	2	3	3	8
Same story throughout	yes	yes	yes	
Additions	//	///	~~////~~ //	12
Deletions	/	////	~~////~~ /	11
Moving text		/		1
Editing				
Capitals	///	/		4
Punctuation		//	~~////~~ //	7
Spelling	/	//	~~////~~ ///	11

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